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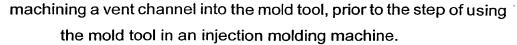
CLAIMS:

- 1. A method for making a prototype plastic injection molded part, comprising the steps of:
- providing computer file data representing a mold tool;
 building the mold tool by depositing roads of a molten thermoplastic
 resin in layers in a predetermined pattern defined by the
 computer file data, the mold tool defining a mold cavity; and
 using the mold tool in an injection molding machine, without the
 additional of any reinforcement fill material or layers, to create
 the prototype part by injection molding of plastic.
 - 2. The method of claim 1, wherein the thermoplastic resin comprises at least about 50 weight percent of a thermoplastic selected from the group consisting of polyphenylsulfone, polysulfone, polystyrene, polyphenylene ether, amorphous polyamides, polycarbonate, acrylics, nylon, poly(2-ethyl-2-oxazoline), and blends thereof.
 - 3. The method of claim 1, wherein the thermoplastic resin is a polyphenylsulfone-based resin.
 - 4. The method of claim 1, wherein a sprue channel and alignment holes are formed into the mold tool as it is built.
 - 5. The method of claim 1, and further comprising the step of: machining a sprue channel into the mold tool, prior to the step of using the mold tool in an injection molding machine.
- The method of claim 1, and further comprising the step of:
 machining a plurality of alignment holes into the mold tool, prior to the step of using the mold tool in an injection molding machine.
 - 7. The method of claim 1, wherein the predetermined pattern results in the mold tool having a porosity sufficient to vent gas in the mold cavity generated by injection of the plastic.
 - 8. The method of claim 1, wherein a vent channel is formed into the mold tool as it is built.
 - 9. The method of claim 1, and further comprising the step of:

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- 10. The method of claim 1, and further comprising the step of: coating surfaces of the mold cavity with a release agent prior to the step of using the mold tool in an injection molding machine.
- 11. The method of claim 1, wherein the step of building the mold tool comprises building two or more mating mold portions, each mold portion having a mold surface, a mating surface, and a base which supports the mold and mating surfaces, the mold surfaces together defining the mold cavity.
- 12. The method of claim 11, and further comprising the step of: smoothing surfaces of the mold tool prior to the step of using the mold tool in an injection molding machine.
- 13. The method of claim 11, wherein the step of building the mold toolfurther comprises building a mold core.
 - 14. The method of claim 13, and further comprising the step of: assembling the mold core in the mating portions of the mold tool prior to the step of using the mold tool in an injection molding machine.
- 20 15. The method of claim 14, wherein the thermoplastic resin forming the mold core is an alkali-soluble thermoplastic, comprising a base polymer containing between about 15 weight percent and 60 weight percent of a carboxylic acid, and a plasticizer, and further comprising the step of:

dissolving the mold core from the prototype part.

25 16. A method for making a prototype plastic injection molded part, comprising the steps of:

providing computer file data representing a mold tool;

building the mold tool by depositing roads of a molten soluble thermoplastic resin in layers in a predetermined pattern defined by the computer file data; using the mold tool in an injection molding machine, without the additional of any reinforcement fill material or layers, to create the prototype part by injection molding of plastic; and dissolving the mold tool to release the prototype part.

- 5 17. The method of claim 16, wherein the soluble thermoplastic resin is an alkali-soluble thermoplastic comprising:
 - a base polymer containing between about 15 weight percent and 60 weight percent of a carboxylic acid, and a plasticizer.
- 10 18. The method of claim 17, wherein the carboxylic acid is methacrylic acid and wherein the base polymer further contains an alkyl methacrylate.
 - 19. The method of claim 18, wherein the alkyl methacrylate is methyl methacrylate and wherein the base polymer contains between about a 1:1 to a 1:2 weight percent ratio of methacrylic acid to methyl methacrylate.